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Loneliness in the United States: A 2018 National Panel Survey of Demographic, Structural, Cognitive, and Behavioral Characteristics

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Abstract

Purpose: To inform health behavior intervention design, we sought to quantify loneliness and its correlates, including social media use, among adults in the United States. Design: Cross-sectional research panel questionnaire. Setting: Responses were gathered from individuals in all 50 states surveyed via Internet from February 2018 to March 2018. Participants: A total of 20 096 US panel respondents aged 18þ. Measures: The University of California at Los Angeles (UCLA) Loneliness Scale (theoretical score range ¼ 20-80) was administered along with demographic, structural, cognitive, and behavioral items. Analysis: After calibrating the sample to population norms, we conducted multivariable linear regression analysis. Results: The overall mean survey-weighted loneliness score was 44.03 (standard error ¼ 0.09). Social support (standardized b [sb] ¼ 0.19) and meaningful daily interactions (sb ¼ 0.14) had the strongest associations with lower loneliness, along with reporting good relationships, family life, physical and mental health, friendships, greater age, being in a couple, and balancing one's daily time. Social anxiety was most strongly associated with greater loneliness (sb ¼ þ0.20), followed by self-reported social media overuse (sb ¼ þ0.05) and daily use of text-based social media (sb ¼ þ0.03). Conclusion: Our findings confirm that loneliness decreases with age, and that being in a relationship as well as everyday behavioral factors in people's control are most strongly related to loneliness. Population health promotion efforts to reduce loneliness should focus on improving social support, decreasing social anxiety, and promoting healthy daily behaviors.

Keywords

mind–body health, interventions, spiritual health, interventions, population health, interventions, social media, awareness, strategies, social support, opportunity, strategies, mental illness, interventions, loneliness, mental health

Disciplines

Cognitive Behavioral Therapy | Cognitive Psychology | Communication Technology and New Media | Gender, Race, Sexuality, and Ethnicity in Communication | Human and Clinical Nutrition | Mental and Social Health | Social Media

Comments

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Design: Cross-sectional research panel questionnaire.

Setting: Responses were gathered from individuals in all 50 states surveyed via Internet from February 2018 to March 2018.

Participants: A total of 20 096 US panel respondents aged 18+.

Measures: The University of California at Los Angeles (UCLA) Loneliness Scale (theoretical score range = 20-80) was administered along with demographic, structural, cognitive, and behavioral items.

Analysis: After calibrating the sample to population norms, we conducted multivariable linear regression analysis.

Results: The overall mean survey-weighted loneliness score was 44.03 (standard error = 0.09). Social support (standardized β [sβ] = −0.19) and meaningful daily interactions (sβ = −0.14) had the strongest associations with lower loneliness, along with reporting good relationships, family life, physical and mental health, friendships, greater age, being in a couple, and balancing one's daily time. Social anxiety was most strongly associated with greater loneliness (sβ = +0.20), followed by self-reported social media overuse (sβ = +0.05) and daily use of text-based social media (sβ = +0.03).

Conclusion: Our findings confirm that loneliness decreases with age, and that being in a relationship as well as everyday behavioral factors in people's control are most strongly related to loneliness. Population health promotion efforts to reduce loneliness should focus on improving social support, decreasing social anxiety, and promoting healthy daily behaviors.

Keywords

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Purpose

Loneliness is defined as a state of emotional distress from lacking desired interpersonal relationships[1] and has been found in numerous studies to correspond with worse mental health outcomes, including depression, dementia, and suicide,[2-4] and with chronic physical health conditions, such as hypertension, heart disease, and diabetes.[5] In recent years, the issue of loneliness and social isolation has gained increased attention and focus.[6] The US Surgeon General sounded the alarm about a "loneliness epidemic" across the United States, and in the United Kingdom in early 2018, Prime Minister Teresa May went so far as to appoint the country's first Minister for Loneliness.

While Maslow first hypothesized in 1954 that the concept of "belonging" was a key factor in Americans' mind–body

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wellness,[7] social psychology researchers have worked to further define and quantify loneliness so that its causes and effects may be further understood.[8] In 2013, Pantell and colleagues reported that effects of problematic social isolation on mortality were comparable to or even higher than other traditional public health risk factors such as smoking and high blood pressure.[9] Entities and individuals investing in health promotion and prevention strategies stand to benefit from knowledge about characteristics and modifiable behaviors associated with loneliness.

In past research, greater age, male gender, and living with one's partner or spouse have all been protective against loneliness,[8] but because the bulk of loneliness research has been done among convenience samples of college students, findings about demographic factors may not be nationally representative. Studies among older adults examining predictors of loneliness concluded that widowhood, poor health, and living alone predict loneliness among British senior citizens,[10] while among American seniors, marital status, poor health, living alone, and motor impairment predict loneliness.[11] Other research has focused on more social and communal predictors of loneliness. Using the lens of collectivistic versus individualistic societal type, Lykes and Kemmelmeier concluded that weak family interactions predict loneliness in more collectivistic European countries, while a lack of friends and confidants predicts loneliness in more individualistic European countries.[12]

Masi and colleagues presented a model of loneliness as arising from individual cognitive maladaptation in which individuals have "increased sensitivity to and surveillance for social threats, preferentially attend to negative social information, remember more of the negative aspects of social events, hold more negative social expectations, and are more likely to behave in ways that confirm their negative expectations."[13] Their findings that the most successful interventions to alleviate loneliness thus addressed these specific maladaptive cognitive patterns suggest that loneliness may be determined more by cognitive-behavioral rather than environmental factors and that lower-than-desired social engagement results from these maladaptive cognitive patterns and behaviors.

In the last decade, technology has changed how we interact with each other and with the world, raising questions about its impact on both our social connectedness and overall well-being. Many previous face-to-face interactions have become virtual as people can now work at home digitally; the proverbial "water cooler" is not the social hub it once was. Of course, social media has increased individuals' ability to share their thoughts and feelings instantly, but is all of this instantaneous connectivity a robust stand-in for in-person interaction? Cause-effect research on loneliness and social media use has been mixed. Loneliness has been found to be a predictor of internet addiction,[14] but Jin concluded in his 2013 study that more lonely people had fewer Facebook friends and less overlap between Facebook and real-life friends.[15] Evidence from a 2014 panel study by Yao and Zhong supported a vicious cycle relationship between loneliness and excessive Internet use; the more lonely people are, the more they use the Internet, which then leads to greater loneliness.[16] Moreover, Morahan-Martin and Schumacher[17] found that lonely people used Internet and e-mail more but were more satisfied with their online interactions than were less lonely people.

Others argue there is no negative link between loneliness and Internet or social media (over)use. In a laboratory study, Shaw and Gant[18] found that greater Internet use, operationalized as chat sessions between anonymous participants, decreased loneliness. Caplan[19] posited a spurious relationship between loneliness and Internet use, hypothesizing that social anxiety, rather than loneliness, is associated with problematic Internet use.

In order to address gaps in knowledge about correlates of loneliness, a need was identified for concurrent measurement of demographic, structural, and behavioral factors in a national sample of adults across the age spectrum. The objectives of this study were to identify and quantify the relative associations of demographic, structural, cognitive, and behavioral covariates (including social media use) with loneliness, and to better understand the relationships of modifiable behavioral factors along with demographic and structural factors. While preliminary survey results were widely reported by news outlets, this article represents a "deep dive" multivariable analysis of the data that have not been published previously.

Methods

On behalf of Cigna (Cigna herein refers to operating subsidiaries of Cigna Corporation including Cigna Health and Life Insurance Company and Cigna Behavioral Health, Inc.), a large US health services company, Ipsos conducted a survey between February 21, 2018, and March 6, 2018. A sample of 20 096 adults aged 18 years and over from the continental United States, Alaska, and Hawai'i were recruited from Ipsos' online panel and surveyed online, in English. Recruitment was conducted among registered I-Say panel members through e-mail lists, banners, website and text ads, co-registration, and search engine marketing. Omnibus (ie, non-survey-specific) sampling was used to set fixed subgroup targets based on US Census 2016 American Community Survey data.[20] To adjust for bias in respondent characteristics and contribute to representativeness, the sample was calibrated to the US population based on the US Census demographic targets. Survey weighting was accomplished using ranking ratio adjustments for gender, age, region, race/ethnicity, and income according to Ipsos rim weighting methods.[21] The precision of Ipsos online polls is measured using a credibility interval. In this case, the poll has a credibility interval of ± 0.8 percentage points for all respondents surveyed.

Consent was obtained from each respondent via a "double opt-in" process for all panelists. Participants first accept the terms and conditions of membership, including detailed information on what data are collected and shared with research partners, and how respondent data may be used. Once the recruitment questionnaire is completed, panelists receive an e-mail and are required to click on the link from the e-mail to confirm they would like to participate in panel membership (constituting the second "opt-in"). Compensation was offered in the form of "iSay" points that are applied toward nonmonetary rewards as well as sweepstakes entries or retail gift cards chosen

Table 1. Total Sample (N = 20 096) Demographic Characteristics, Weighted, and Unweighted Totals and Percentages.[a]

	Unweighted, n (%)	Weighted, n (%)
Gender		
Male	7646 (38)	9688 (48)
Female	12 450 (62)	10 408 (52)
Age		
18-25 years	1989 (10)	2252 (11)
26-34 years	3245 (16)	3677 (18)
35-64 years	11 375 (57)	11 076 (55)
65+ years	3487 (17)	3092 (15)
Race/ethnicity		
White	16 220 (81)	13 036 (65)
Hispanic	1418 (7)	3129 (16)
Black	1363 (7)	2341 (12)
Asian	544 (3)	1117 (6)
Other Race	551 (3)	472 (2)
Census region		
Northeast	3888 (19)	3579 (18)
Midwest	4612 (23)	4233 (21)
South	7280 (36)	7539 (38)
West	4316 (21)	4745 (24)
Urban–rural		
Urban	10 976 (55)	11 182 (56)
Nonurban	9120 (45)	8914 (44)

[a]Respondents provided age as an integer. Geographic region was collected as state and recoded to US Census regions. Urban versus rural classification was based on US Census Core Based Statistical Area Codes.

Table 2. Sample Structural Characteristics, Weighted, and Unweighted Totals and Percentages.[a]

	Unweighted, n (%)	Weighted, n (%)
Veteran status		
Veteran	2088 (10)	2320 (12)
Nonveteran	18 008 (90)	17 776 (88)
Education		
High school	4123 (21)	3692 (19)
Some college	5018 (26)	4749 (24)
College degree	7529 (38)	7699 (39)
Graduate degree	2911 (15)	3448 (18)
Employment status		
Employed	11 104 (57)	12 134 (63)
Unemployed	2422 (13)	2100 (11)
Homemaker	1691 (9)	1371 (7)
Retired	4147 (21)	3691 (19)
Student	560 (3)	640 (3)
Living situation		
Living alone	4281 (21)	3869 (19)
Living with others	15 815 (77)	16 227 (79)
Single-parent home	542 (3)	508 (2)
Marital status		
Single	4590 (22)	4886 (24)
Living with partner	1615 (8)	1571 (8)
Married	10 334 (51)	10 721 (53)
Widowed	915 (5)	746 (4)
Divorced or separated	2642 (13)	2172 (11)
Household income		
Under $10 000	1166 (6)	1053 (5)
$10 000-$24 999	2720 (14)	2149 (11)
$25 000-$39 999	3211 (17)	2793 (14)
$40 000-$49 999	1752 (9)	1463 (7)
$50 000-$59 999	1825 (9)	1493 (8)
$60 000-$74 999	2203 (11)	1745 (9)
$75 000-$84 499	1339 (7)	1247 (6)
$85 000-$99 999	1646 (8)	1534 (8)
$100 000-$124 999	1582 (8)	2714 (14)
$125 000-$149 999	894 (5)	1501 (8)
$150 000 or more	1114 (6)	1905 (10)

[a]Respondent education level was collected as: grade school, some high school, graduated high school, some college, associate's degree (AA, AS, etc), bachelor's degree (BA, BS, etc), or postgraduate degree. "Some College" and above were used to dichotomize education for the model. Age and presence of children in household collected as ("under 6 only," "6-12 only," "13-17 only," "under 6 and 6-12," "under 6 and 13-17," "6-12 and 13-17," "all 3", or "none under 18"). Marital status collected as "single," "domestic partnership," "married," "widowed," or "divorced or separated." Employment status collected as "employed full-time," "employed part time," "self-employed," "retired," "student/pupil," "military," "homemaker," "currently unemployed,", don't know/not sure". Income was recorded dichotomously for modeling as "high" if $75 000 or more annually per household.

by the respondents. As a quality improvement initiative, the study did not constitute human subjects research in accordance with Office of Human Research Protections guidance on Health and Human Services regulations at 45 CFR 46.102(d). All activities were conducted in accordance with the Marketing Research and Intelligence Association, Marketing Research Association, and Council of American Survey Research Organizations standards for North America, and in compliance with the International Chamber of Commerce Code of Conduct on Market, Opinion, and Social Research and Data Analytics.

To be eligible for participation, respondents had to be a member of the Ipsos panel, report a state of residence in the United States, be 18 years of age or older, and opt in to complete the survey. In order to avoid missing data or implausible values, responses were required to all questions.

Demographic and Structural Predictor Variables

Respondents self-reported demographic and structural factors using standard survey questions including gender, age, race, ethnicity, geographic region, income, education, presence of children in the household, marital status, and employment status. Details on how these variables were collected are given in Tables 1 and 2 (noting how they were originally collected if they were ultimately recoded for the analysis). Age was collected as a continuous integer but divided into categories to explore potential nonlinear relationships or meaningful cutoffs that could affect loneliness such as US retirement age of 65 years. A dichotomous metro/urban designation (at least 1 million inhabitants) was imputed from respondent ZIP codes using core-based statistical area codes.[22]

Cognitive and Behavioral Variables

The following questions reflected cognitive and behavioral characteristics included in the questionnaire, selected based on extant

research, and which also lent themselves to feasible data collection via Internet survey: social support ("I have enough people I feel comfortable asking for help at any time"),[23-26] perceived social well-being and functioning (making good impressions, having meaningful daily interactions, having a good social life/relationships/friendships/work/family life),[19,27,28] self-rated mental health,[5,29-31] physical health,[1,30,32,33] sleep,[34] exercise,[35,36] finances,[37,38] time with family and by oneself (response choices were "more than I would normally desire," "just the right amount of time," and "less than I would normally desire"),[16,39,40] social anxiety ("I find it difficult to approach others"),[26,41,42] and social media platform type and usage[43-46]: frequency of use of Snapchat, Facebook, Twitter, and Instagram, with response choices as "several times a day," "about once a day," "3 to 6 times a week," "1 to 2 times a week," "every few weeks," "less often," or "never," and extent of worry that social media is replacing time one could spend with others, with response options "strongly agree," "somewhat agree," "somewhat disagree," or "strongly disagree."

Outcome Variable

The University of California at Los Angeles (UCLA) Loneliness Scale is a survey tool developed to measure the construct of loneliness through survey methods.[47] The outcome of loneliness was measured using version 3 of the University of California at Los Angeles survey instrument originally developed using responses from college-age students in the late 1970s by Russell and colleagues[48] and revised since to refine the wording and reduce bias in response directionality.[49] Version 3 was validated in 1996 for its psychometric properties in a US sample of adults[47,50] and has become the most widely used scale to measure loneliness as it corresponds to a variety of mental and physical health outcomes. Coefficient α from validation and development research ranges from 0.89 to 0.94 on the scale.[47] The scale consists of 20 positively and negatively worded questions (eg, "How often do you feel that there are people you can talk to?," "How often do you feel that people are around you but not with you?"), with 4 response options for each question: "always," "sometimes," "rarely," or "never." Past population-based research posited that the 20-item scale was not suited for telephone administration,[51] but the 20-item version 3 has been used extensively online.[5] Following author scoring rules, the positively worded items are reversed so that all 20 items are scored from 1 ("never") to 4 ("always"), for a total possible composite score range of 20 to 80 points, with higher scores indicating greater loneliness.

Statistical Analyses

A multivariable linear regression model was fit to identify covariates with the 20 to 80 loneliness score as the dependent variable. Exploratory analyses were first conducted to ensure assumptions of linearity, test coding of continuous variables, recategorize categorical variables wherever dichotomous coding was logical for ease of use in the model, identify strata-specific associations that would prompt inclusion of higher order terms, and screen variables for model inclusion. Correlations were run for all independent variables and variance inflation factors were calculated to rule out multicollinearity; the criterion used to detect multicollinearity was a variance inflation factor greater than 10. The criterion to determine statistical significance for the regression coefficients was set at $\alpha = 0.01$ due to the large sample size. The analyses were conducted using survey commands in Stata statistical software version 14.2 (StataCorp, College Station, Texas).

Results

A total of 20 096 individuals responded to the survey. The highest raw frequencies of respondents came from more populous states including California, New York, Texas, Pennsylvania, Florida, and Illinois. Tables 1 and 2 show demographic and structural characteristics of the sample prior to and following the weighting. For gender, age, and race, unadjusted distributions were: 62% female, with 57% aged 35 to 64 years, and 81% white race. Sample weighting was calibrated to the US Census to ensure representativeness. Generalizability did not appear to markedly change the frequency distribution of the other demographic variables including geographic region and urban/rural designation, nor any of the structural characteristics such as education or marital status (Table 2). Table 3 shows the unadjusted outcome means and standard errors for each survey variable and level. As shown in Appendix A, no variance inflation factor exceeded or even approached 10. Coefficient α across the 20 loneliness questions was 0.94. While initial model iterations included continuously coded age, the final model included dichotomously coded age. The interim model coefficient for continuously coded age was $\beta = -0.07$ ($P < 0.001$). All variable coefficients remained stable in direction, magnitude, and statistical significance regardless of variable selection or coding decisions.

The overall mean survey-weighted loneliness score was 44.03, with a standard error of 0.09. Greater age was associated with lower loneliness scores. The following were individually associated in the exploratory analyses with greater loneliness: lower education, nonurban living, non-white race, not being a veteran, being unemployed, being single, and reporting lower income. While daily use of YouTube and Tumblr was also individually associated in the exploratory analyses with higher loneliness, daily use of LinkedIn was negatively associated with loneliness. It is important to note that these individual unadjusted associations were subject to potential confounding; their values are reported for the purpose of detailing the regression model variable selection processes.

Table 4 displays the coefficients of covariates selected for the final multivariable regression model, with loneliness scored 20 to 80 as a continuous dependent variable. Total explained covariance was 0.60 as measured by the model's adjusted R^2 value. Social support as reflected in a good support network ("I have enough people I feel comfortable asking for help at any

Table 3. Exploratory Analyses of Unadjusted Mean Loneliness Scores (Survey Weighted) by Individual Respondent Characteristics.

Characteristics	Mean (Standard Error)
Gender	
Male	43.81 (0.15)
Female	44.24 (0.12)
Age	
18-25 years	47.87 (0.29)
26-34 years	44.92 (0.23)
35-64 years	44.08 (0.13)
65+ years	40.00 (0.19)
Race/ethnicity	
White	43.68 (0.09)
Hispanic	44.83 (0.34)
Black or African American	44.39 (0.33)
Asian	44.57 (0.45)
Other	45.37 (0.55)
Census region	
Northeast	43.65 (0.21)
Midwest	44.37 (0.19)
South	44.11 (0.16)
West	43.88 (0.20)
Urban-rural	
Urban	43.66 (0.13)
Non-urban	44.50 (0.14)
Veteran status	
Veteran	42.67 (0.30)
Nonveteran	44.21 (0.10)
Education	
High school or less	45.45 (0.20)
Some college	44.83 (0.20)
College degree	43.15 (0.13)
Graduate degree	43.24 (0.45)
Employment status	
Employed	43.68 (0.13)
Unemployed	49.03 (0.27)
Homemaker	44.88 (0.31)
Retired	41.15 (0.19)
Student	47.85 (0.51)
Marital status	
Single	47.78 (0.20)
Living with partner	44.45 (0.37)
Married	41.75 (0.12)
Widowed	44.44 (0.46)
Divorced or separated	46.42 (0.27)
Household income	
Under $10 000	49.67 (0.39)
$10 000-$24 999	48.47 (0.35)
$25 000-$39 999	45.86 (0.24)
$40 000-$49 999	44.36 (0.30)
$50 000-$59 999	44.63 (0.25)
$60 000-$74 999	42.69 (0.33)
$75 000-$84 499	42.85 (0.28)
$85 000-$99 999	42.95 (0.32)
$100 000-$124 999	42.33 (0.30)
$125 000-$149 999	40.70 (0.40)
$150 000 or more	40.96 (0.37)
Instagram	
Yes	44.27 (0.19)
No	43.95 (0.11)
Facebook	
Yes	43.94 (0.11)
No	44.20 (0.17)
Snapchat	
Yes	44.58 (0.24)
No	43.92 (0.10)
Twitter	
Yes	44.29 (0.26)
No	43.98 (0.10)
YouTube	
Yes	45.59 (0.18)
No	43.21 (0.11)
Pinterest	
Yes	43.84 (0.27)
No	44.06 (0.10)
LinkedIn	
Yes	42.63 (0.40)
No	44.12 (0.10)
Tumblr	
Yes	46.45 (0.59)
No	43.94 (0.10)

time") had the strongest association in magnitude with decreased loneliness (standardized β coefficient [sβ] = −0.19), followed by meaningful daily interactions (sβ = −0.14). The following factors were also significantly associated ($P < 0.01$) with lower likelihood of loneliness, but with effects of lesser magnitude: greater age, being married or living with a partner, daily use of Facebook, reporting getting the right amount of family time, right amount of time to socialize, right amount of sleep, good overall health, right amount of in-person social interactions, good family life, good romantic relationships, contentedness with friendships, good mental health, good social life, and agreeing with the statement "I make a good impression on others."

The factors with strongest magnitude associations with greater loneliness in the multivariable model were social anxiety/difficulty approaching others (sβ = +0.20) and expressing worry about social media replacing time that could be spent with others (sβ = +0.05), followed by daily use of Twitter, a text-based social media platform (sβ = +0.03). Figure 1 displays the relative magnitude of each significantly associated variable in order of effect.

Conclusions

With the goal of maximizing population health and well-being, Cigna, a large health services company based in the United States, conducted a national survey of loneliness and its covariates in 20 096 respondents in order to better understand loneliness as part of behavioral health and wellness promotion. Loneliness is discussed in lay/media contexts with an assumption that as we age, we are more likely to end up living alone and to be less physically active than younger people. However, our findings were

Table 4. Multivariable Regression Model Effects for Loneliness Score (20-80).[a]

Covariates	β Coefficient	Standardized β Coefficient	*P*
Age 65+	**−1.55**	**−0.05**	**<0.01**
Male	0.30	0.01	0.03
Geographic region (referent: Northeast)			
Midwest	0.10	0.00	0.59
South	0.08	0.00	0.65
West	−0.17	−0.01	0.38
Urban (>1 million people)	−0.31	−0.01	0.01
Family size (continuous, 1-7)	−0.22	−0.02	0.10
Couple (married, living with partner)	**−0.73**	**−0.03**	**<0.01**
Parent	0.48	0.02	0.08
Veteran	−0.12	−0.00	0.59
College education	0.27	0.01	0.04
Income 75 000+	−0.19	−0.01	0.20
Property ownership	−0.26	−0.01	0.08
Self-report as white and non-Hispanic	−0.42	−0.02	0.01
Social media			
Daily use of Facebook	**−0.41**	**−0.02**	**<0.01**
Daily use of Twitter	**0.84**	**0.03**	**<0.01**
Daily use of Snapchat	0.23	0.01	0.27
Daily use of Instagram	0.37	0.01	0.05
Worry about social media replacing time that could be spent with others	**1.33**	**0.05**	**<0.01**
Get right amount of family time or not (dichotomous)	**−0.53**	**−0.02**	**<0.01**
Get right amount of "me" time or not (dichotomous)	**−0.58**	**−0.03**	**<0.01**
Get right amount of time to socialize or not(dichotomous)	**−0.69**	**−0.03**	**<0.01**
Get right amount of sleep or not(dichotomous)	**−0.73**	**−0.03**	**<0.01**
Good (excellent, very good, good) physical health(dichotomous)	0.28	0.01	0.10
Get right amount of exercise or not(dichotomous)	0.17	0.01	0.21
Get right amount of work or not (dichotomous)	−0.27	−0.01	0.04
Good (excellent, very good, good) financial situation(dichotomous)	−0.32	−0.01	0.03
Overall good health (excellent, very good, good health) or not(dichotomous)	**−1.37**	**−0.05**	**<0.01**
Get right amount of in-person social interactions or not(dichotomous)	**−1.46**	**−0.06**	**<0.01**
Good (excellent, very good, good) family life(dichotomous)	**−1.94**	**−0.07**	**<0.01**
Good (excellent, very good, good) romantic relationships(dichotomous)	**−2.06**	**−0.09**	**<0.01**
I am content with friendships and relationships	**−2.20**	**−0.08**	**<0.01**
Good (excellent, very good, good) mental health (dichotomous)	**−2.24**	**−0.08**	**<0.01**
Good (excellent, very good, good) social life(dichotomous)	**−2.94**	**−0.12**	**<0.01**
Difficulty approaching others	**4.60**	**0.20**	**<0.01**
I make a good impression on others	**−2.99**	**−0.09**	**<0.01**
Meaningful daily interactions	−3.23	−0.14	<0.01
Good social support	−4.74	−0.19	<0.01

[a]Final model adjusted $R^2 = 0.60$. Bold font used to indicate statistical significance at $\alpha = 0.01$.

consistent with prior research that loneliness decreases with age.[52] The average loneliness score in our subpopulation of 45 and older was 43.21 (standard deviation: ±11.4), while average loneliness scores from a recent AARP survey (AARP is the current name of a US nonpartisan interest group, formerly known as the American Association of Retired Persons) of individuals aged 45 years and older was 39.73.[53] While the mean score of our sample was slightly higher, the relationships found among the demographics studied are consistent with prior research. Our findings about age are noteworthy in that they confirm, essentially, the good news that loneliness gets to be less and less of a problem for Americans as they get older.

Social support, meaningful daily interactions, and low social anxiety had the strongest magnitude associations with decreased loneliness in comparison with the other factors studied. Self-assessment of outcomes such as good health and good family life is associated with lower loneliness in lesser magnitude than the above factors, but in greater magnitude than the time management variables (getting the right amount of in-person social interactions, time to socialize, sleep, "me" time). Social media platform did not appear to be as important as respondents' self-reported overuse of social media, that is, the level of worry that time they were spending on social media was replacing time they could be spending with others, underscoring the importance of individual daily time management. Researchers wishing to study loneliness longitudinally could consider using perceived social media overuse as a beacon modifiable behavioral measure if social media platforms

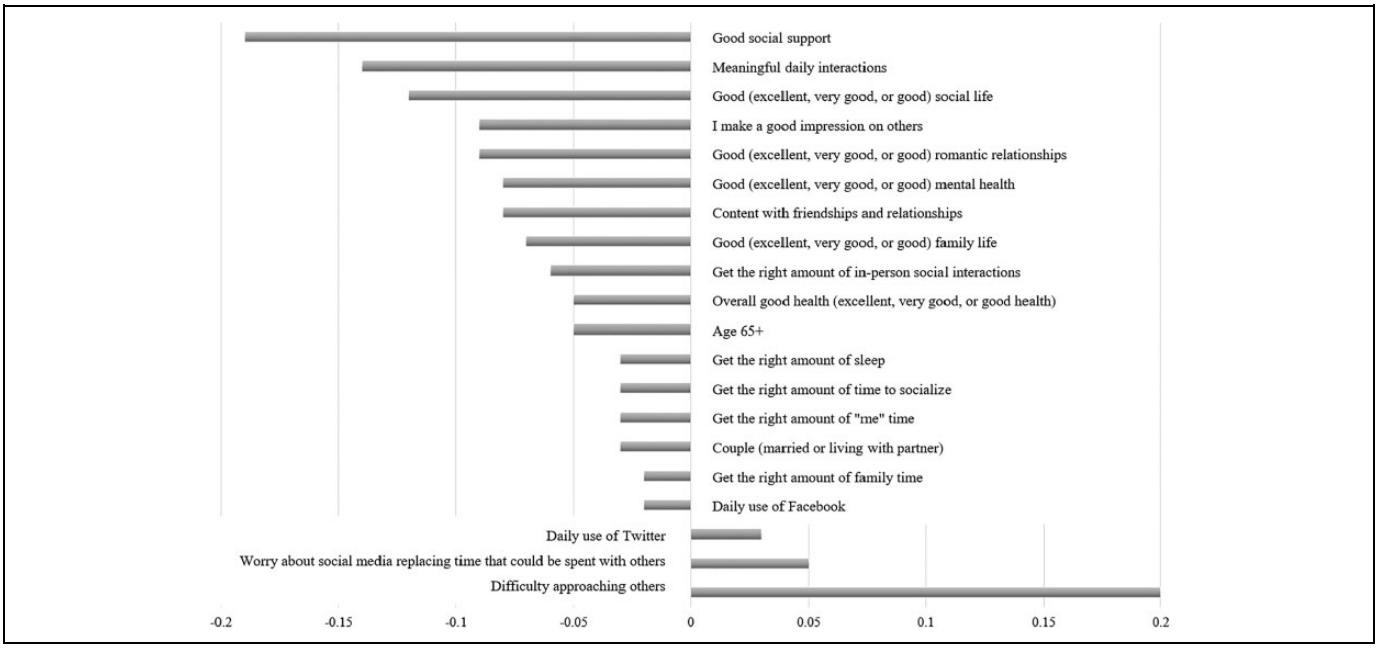

Figure 1. Relative magnitude of factors associated with loneliness among US adults in 2018 (N = 20 096; x-axis is standardized β).

change. Data on the constructs of social support and social well-being can be practically gathered using validated, low-burden short and computer adaptive forms available through the Patient-Reported Outcome Measurement Information System.[27,54]

Our study found better self-reported overall physical and mental health to correlate with lower loneliness scores. This finding is consistent with an underlying mechanism of mind–body, "whole person" wellness that extends beyond treating illness to motivate intervention efforts toward disease prevention and health promotion. While future studies should also examine indicators of physical health such as daily physical activity, our findings could potentially be explained by respondents' resilience and coping skills, given past research in which loneliness among young adults predicted higher total peripheral resistance and lower cardiac output, during a normal day.[55] Similarly, in past research, age differences in stress reactivity and recovery (as measured by systolic blood pressure) were greater among lonely versus nonlonely participants.[56]

Building on the need for health promotion program design from a public health perspective, we used recent data to explore biopsychosocial characteristics including social media use trends across a wide range of age and demographic groups. While specific platforms may come and go, prior research has suggested that daily use of text-based social media (Twitter) is associated with greater loneliness than daily use of image-based social media such as Facebook, Instagram, or Yik-Yak.[45] Our finding of decreased correlation between image-based versus text-based social media and loneliness could be explained by individual Americans' biochemical social reward from giving and receiving "likes" on image-based platforms.[57] Our findings with respect to Facebook were consistent with one experimental study of users instructed to post more updates than they typically do. Increased posting was associated with reduced loneliness, independent of responses by friends, and participants reported feeling more connected to their friends on a daily basis.[58] However, Lou and colleagues found among college students that loneliness did not predict intensity of using Facebook nor motive for using.[59] A 2016 study of college students using Instagram revealed that interaction and browsing were both related to lower loneliness, whereas broadcasting was associated with higher loneliness. The study's author also reported that a personality trait, social comparison orientation, moderated the relationship between Instagram use and loneliness such that Instagram interaction was related to lower loneliness only for users with low social comparison orientation.[46] While social media use has been shown to be protective among adolescents with serious mental illness,[44] findings from this study imply that adults in the general population could combat loneliness by better managing time spent online versus in-person with their families and friends.

One limitation of this study is its cross-sectional design, which limits causal inferences with respect to identifying predictors and outcomes of loneliness. Future longitudinal studies are needed to focus on effective intervention design; however, if more permanent structural and demographic factors (other than age) had a stronger effects on loneliness than do behavioral factors, such associations would still be observed in a cross-sectional multivariable model that includes structural, demographic, and behavioral factors. Another limitation of this study is that the survey format only lent itself to self-reported health, limiting ability to interpret associated covariates as potential risk factors. Even though the sample was weighted using US Census norms to be representative of the population

demographics, all 20 096 respondents were Internet users; if Internet use is a protective factor against depression and isolation as one ages,[60] it is possible that elderly adults who do not use the Internet or telephone to interact socially could be experiencing social isolation unmeasured in this study. However, our study confirmed past research on age leading to lesser loneliness, in which the UCLA questionnaire was validated among elderly persons recruited through a variety of methods.[47] Our findings could be subject to omitted variable bias in that we did not measure certain factors potentially related to loneliness including detailed mental health problems, religion (found to be protective in one study in women, but not in men),[23] or serving in a caregiver role. These factors should be considered for inclusion in future research.

The large sample size is a strength of this study, as well as the fact that to our knowledge, this study is the largest to date to use the validated gold standard UCLA Loneliness Scale, the largest sample size reported from among 34 eligible studies in a 2018 review being Dour et al with a total sample size of 1004.[26] Social desirability/stigma can influence responses, especially as related to a yes/no "indicator" question, thus another strength of this study was the use of the validated full 20-question scale.

Our conclusions offer direction for identifying the problem of loneliness and setting goals for healthier social behavior among those seeking support or resources. As is the case with pain and other somatic problems, individuals' perception of suffering from loneliness is subjective and must be self-reported. Active listening and engagement are the keys to promoting behavior change to address such problems. Providers and health plans may be able to help mitigate the negative mental and physical health impacts of loneliness by helping individuals identify healthy versus unhealthy social behaviors and better manage their daily time to promote good health. Future research should assess the value of loneliness screening in longitudinal behavior changes, as well as clinical and mental health outcomes.

It is encouraging that social and behavioral factors were more strongly related to loneliness than were demographic and structural conditions beyond individuals' control. Health promotion practitioners can leverage technology to improve social connections, rather than increase isolation (eg, institutions sponsoring or offering incentives for teams of students, employees, or community members promoting athletic fund raisers and contests on social media). Health promotion partnering involves engaging individuals when they are well in the same conduits to health in which they engage when ill: continuity, access, management, evidence-based treatment, feasible goals and expectations, shared decision-making, accountability among small support teams, and documentation of outcomes. Our findings are intended to guide practical design of preventive health interventions to decrease loneliness by promoting healthy online and in-person social behaviors.

Appendix A

Tests of Multicollinearity.[a]

Characteristics	Variance Inflation Factor
Age 65+ years (dichotomous)	1.27
Midwest region (comparison group: Northeast, the excluded region)	1.71
South region (comparison group: Northeast, the excluded region)	1.87
West region (comparison group: Northeast, the excluded region)	1.67
Parent or not (dichotomous)	4.01
Family size (1-7)	3.84
Couple (married, living with partner) or not	1.62
Own property or not (dichotomous)	1.39
Income 75 000+ or not (dichotomous)	1.36
College education or not (dichotomous)	1.17
White, non-Hispanic or not (dichotomous)	1.09
Live in region with 1 million people or not (dichotomous)	1.07
Male (dichotomous)	1.16
Veteran or not (dichotomous)	1.15
Daily user of Instagram or not (dichotomous)	1.55
Daily user of Facebook or not (dichotomous)	1.13
Daily user of Snapchat or not (dichotomous)	1.41
Daily user of Twitter or not (dichotomous)	1.20
Have meaningful daily interactions or not (dichotomous)	1.25
Overall healthy (excellent, very good, good health) or not (dichotomous)	1.81
Get right amount of sleep or not (dichotomous)	1.16
Get right amount of work or not (dichotomous)	1.14
Get right amount of time to socialize or not (dichotomous)	1.56
Get right amount of family time or not (dichotomous)	1.22
Get right amount of "me" time or not (dichotomous)	1.27
Get right amount of in-person social interactions or not (dichotomous)	1.60
Get right amount of exercise or not (dichotomous)	1.15
Good (excellent, very good, good) physical health (dichotomous)	1.78
Good (excellent, very good, good) social life (dichotomous)	1.87
Good (excellent, very good, good) family life (dichotomous)	1.59
Good (excellent, very good, good) financial situation (dichotomous)	1.47
Good (excellent, very good, good) mental health (dichotomous)	1.57
Good (excellent, very good, good) romantic relationships (dichotomous)	1.71
Worry social media is replacing time I could spend with others	1.10
I find it difficult to approach others	1.19
I make a good impression on others	1.18
I am content with friendships and relationships	1.74
I have enough people I feel comfortable asking for help at any time	1.58

[a]Variance inflation factor >10 is evidence for multicollinearity.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Loneliness is known to be related to poor health outcomes, yet current knowledge about loneliness correlates is limited to studies of smaller convenience samples with limited generalizability to the US population. Those with an interest in population health promotion and wellness initiatives can benefit from better understanding how individual characteristics and behaviors including social media usage relate to loneliness.

What does this article add?

In a large national survey of 20 096 US respondents aged 18 years and older, those reporting good social support and meaningful daily interactions reported lower loneliness, along with those reporting good relationships, family life, physical and mental health, good friendships, greater age, being in a couple, and balancing one's daily time well. Those with higher social anxiety, self-assessed social media overuse, and daily use of text-based social media reported greater loneliness.

What are the implications for health promotion practice or research?

Our study confirmed that loneliness decreases with age and being in a couple, and indicated that everyday social behaviors were more strongly related to loneliness than were other demographic and structural factors such as gender, race, or income. Health promotion partners could consider discussing loneliness to help individuals think about healthy social behaviors and to provide social support resources as appropriate. Our findings are intended to guide practical design of preventive health benefits and initiatives.

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References

1. Heinrich LM, Gullone E. The clinical significance of loneliness: a literature review. *Clin Psychol Rev*. 2006;26(6):695-718.
2. Chang EC, Wan L, Li P, et al. Loneliness and suicidal risk in young adults: does believing in a changeable future help minimize suicidal risk among the lonely? *J Psychol*. 2017;151(5):453-463.
3. Donovan NJ, Okereke OI, Vannini P, et al. Association of higher cortical amyloid burden with loneliness in cognitively normal older adults. *JAMA Psychiatry*. 2016;73(12):1230-1237.
4. Donovan NJ, Wu Q, Rentz DM, Sperling RA, Marshall GA, Glymour MM. Loneliness, depression and cognitive function in older U.S. adults. *Int J Geriatr Psychiatry*. 2017;32(5):564-573.
5. Leigh-Hunt N, Bagguley D, Bash K, et al. An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Public Health*. 2017;152:157-171.
6. Cacioppo JT, Cacioppo S. The growing problem of loneliness. *Lancet*. 2018;391(10119):426.
7. Maslow AH. *Motivation and Personality*. New York: Harper & Row; 1954.
8. Russell D. Living arrangements, social integration, and loneliness in later life: the case of physical disability. *J Health Soc Behav*. 2009;50(4):460-475.
9. Pantell M, Rehkopf D, Jutte D, Syme SL, Balmes J, Adler N. Social isolation: a predictor of mortality comparable to traditional clinical risk factors. *Am J Public Health*. 2013;103(11):2056-2062.
10. Yang K. Longitudinal Loneliness and Its Risk Factors among Older People in England. *Can J Aging*. 2018;37(1):12-21.
11. Theeke LA. Predictors of loneliness in U.S. adults over age sixty-five. *Arch Psychiatr Nurs*. 2009;23(5):387-396.
12. Lykes VA, Kemmelmeier M. What predicts loneliness? Cultural difference between individualistic and collectivistic societies in Europe. *J Cross Cult Psychol*. 2014;45(3):468-490.
13. Masi CM, Chen H-Y, Hawkley LC, Cacioppo JT. A meta-analysis of interventions to reduce loneliness. *Pers Soc Psychol Rev*. 2011;15(3):219-266.
14. Kim J, Haridakis PM. The role of internet user characteristics and motives in explaining three dimensions of internet addiction. *Journal of Computer-Mediated Communication*. 2009;14(4):988-1015.
15. Jin B. How lonely people use and perceive Facebook. *Comput Hum Behav*. 2013;29(6):2463-2470.
16. Yao MZ, Zhong Z-J. Loneliness, social contacts and internet addiction: a cross-lagged panel study. *Comput Hum Behav*. 2014;30:164-170.
17. Morahan-Martin J, Schumacher P. Loneliness and social uses of the internet. *Comput Hum Behav*. 2003;19(6):659-671.
18. Shaw LH, Gant LM. In defense of the internet: the relationship between internet communication and depression, loneliness, self-esteem, and perceived social support. *Cyberpsychol Behav*. 2002;5(2):157-171.
19. Caplan SE. Relations among loneliness, social anxiety, and problematic internet use. *Cyberpsychol Behav*. 2007;10(2):234-242.

20. American Fact Finder. 2016. https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2016/. Accessed March 21, 2019.
21. Weighting Online Surveys. 2010. Ipsos Media CT. https://www.ipsos.com/sites/default/files/publication/1970-01/Ipsos%20MediaCT%20_Weighting%20Online%20Surveys_062010.pdf. Accessed March 21, 2019.
22. Core-Based Statistical Area Codes. 2003. https://www.census.gov/geo/reference/gtc/gtc_cbsa.html. Accessed March 21, 2019.
23. Kirkpatrick LA, Shillito DJ, Kellas SL. Loneliness, social support, and perceived relationships with god. *J Soc Pers Relat*. 1999;16(4):513-522.
24. Schnittker J. Look (closely) at all the lonely people: age and the social psychology of social support. *J Aging Health*. 2007;19(4):659-682.
25. Spino E, Kameg KM, Cline TW, Terhorst L, Mitchell AM. Impact of social support on symptoms of depression and loneliness in survivors bereaved by suicide. *Arch Psychiat Nurs*. 2016;30(5):602-606.
26. Wang J, Mann F, Lloyd-Evans B, Ma R, Johnson S. Associations between loneliness and perceived social support and outcomes of mental health problems: a systematic review. *BMC Psychiatry*. 2018;18(1):156.
27. Castel LD, Williams KA, Bosworth HB, et al. Content validity in the PROMIS social-health domain: a qualitative analysis of focus-group data. *Qual Life Res*. 2008;17(5):737-749.
28. McClintock MK, Dale W, Laumann EO, Waite L. Empirical redefinition of comprehensive health and well-being in the older adults of the United States. *Proc Natl Acad Sci U S A*. 2016;113(22):E3080.
29. Cacioppo S, Grippo AJ, London S, Goossens L, Cacioppo JT. Loneliness: clinical import and interventions. *Perspect Psychol Sci*. 2015;10(2):238-249.
30. Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. *J Health Soc Behav*. 2009;50(1):31-48.
31. Schinka KC, van Dulmen MHM, Mata AD, Bossarte R, Swahn M. Psychosocial predictors and outcomes of loneliness trajectories from childhood to early adolescence. *J Adolescence*. 2013;36(6):1251-1260.
32. Dong X, Chang ES, Wong E, Simon M. Perception and negative effect of loneliness in a Chicago Chinese population of older adults. *Arch Gerontol Geriat*. 2012;54(1):151-159.
33. Fees BS, Martin P, Poon LW. A model of loneliness in older adults. *J Gerontol B Psychol Sci Soc Sci*. 1999;54(4):P239.
34. Segrin C, Burke TJ. Loneliness and sleep quality: dyadic effects and stress effects. *Behav Sleep Med*. 2015;13(3):241-254.
35. LeCheminant J, Merrill RM, Masterson TD. Changes in behaviors and outcomes among school-based employees in a wellness program. *Health Promot Pract*. 2017;18(6):895-901.
36. Page RM, Lee C-M, Miao N-F, Dearden K, Carolan A. Physical activity and psychosocial discomfort among high school students in Taipei, Taiwan. *Int Q Community Health Educ*. 2003;22(3):215-228.
37. Scott SB, Jackson BR, Bergeman CS. What contributes to perceived stress in later life? A recursive partitioning approach. *Psychol Aging*.2011;26(4):830-843.
38. Scott SB, Whitehead BR, Bergeman CS, Pitzer L. Combinations of stressors in midlife: examining role and domain stressors using regression trees and random forests. *J Gerontol B Psychol Sci Soc Sci*. 2013;68(3):464-475.
39. Jackson LA, Wang J-L. Cultural differences in social networking site use: a comparative study of China and the United States. *Comput Hum Behav*. 2013;29(3):910-921.
40. Litwin H, Shiovitz-Ezra S. Social network type and subjective well-being in a national sample of older Americans. *Gerontologist*. 2011;51(3):379-388.
41. Reid DJ, Reid FJM. Text or talk? Social anxiety, loneliness, and divergent preferences for cell phone use. *Cyberpsychol Behav*. 2007;10(3):424-435.
42. Stickley A, Koyanagi A, Koposov R, et al. Loneliness and its association with psychological and somatic health problems among Czech, Russian and U.S. adolescents. *BMC psychiatry*. 2016;16(1):128.
43. Barry CT, Sidoti CL, Briggs SM, Reiter SR, Lindsey RA. Adolescent social media use and mental health from adolescent and parent perspectives. *J Adolesc*. 2017;61:1-11.
44. Brusilovskiy E, Townley G, Snethen G, Salzer MS. Social media use, community participation and psychological well-being among individuals with serious mental illnesses. *Comput Hum Behav*. 2016;65:232-240.
45. Pittman M, Reich B. Social media and loneliness: Why an Instagram picture may be worth more than a thousand Twitter words. *Comput Hum Behav*. 2016;62:155-167.
46. Yang C. Instagram use, loneliness, and social comparison orientation: interact and browse on social media, but don't compare. *Cyberpsychol Behav Soc Netw*. 2016;19(12):73-708.
47. Russell DW. UCLA loneliness scale (Version 3): reliability, validity, and factor structure. *J Pers Assess*. 1996;66(1):20-40.
48. Russell D, Peplau LA, Ferguson ML. Developing a measure of loneliness. *J Pers Assess*. 1978;42(3):290-294.
49. Russell D, Peplau LA, Cutrona CE. The revised UCLA Loneliness Scale: concurrent and discriminant validity evidence. *J Pers Soc Psychol*. 1980;39(3):472-480.
50. Allen RL, Oshagan H. The UCLA loneliness scale: invariance of social structural characteristics. *Pers Indiv Differ*. 1995;19(2):185-195.
51. Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res Aging*. 2004;26(6):655-672.
52. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci*. 2015;10(2):227-237.
53. Anderson GO.*Loneliness Among Older Adults: A National Survey of Adults 45+*. Washington, DC: AARP Research; 2010.
54. Hahn EA, Devellis RF, Bode RK, et al. Measuring social health in the patient-reported outcomes measurement information system (PROMIS): item bank development and testing. *Qual Life Res*. 2010;19(7):1035-1044.

55. Hawkley LC, Burleson MH, Berntson GG, Cacioppo JT. Loneliness in everyday life: cardiovascular activity, psychosocial context, and health behaviors. *J Pers Soc Psychol*. 2003;85(1): 105-120.
56. Ong AD, Rothstein JD, Uchino BN. Loneliness accentuates age differences in cardiovascular responses to social evaluative threat. *Psychol Aging*. 2012;27(1):190-198.
57. Sherman LE, Hernandez LM, Greenfield PM, Dapretto M. What the brain 'Likes': neural correlates of providing feedback on social media. *Soc Cogn Affect Neurosci*. 2018;13(7):699-707.
58. Deters FG, Mehl MR. Does posting Facebook status updates increase or decrease loneliness? an online social networking experiment. *Soc Psychol Pers Sci*. 2013;4(5).
59. Lou LL, Yan Z, Nickerson A, McMorris R. An examination of the reciprocal relationship of loneliness and Facebook use among first-year college students. *J Educ Comput Res*. 2012;46(1): 105-117.
60. Cotten SR, Ford G, Ford S, Hale TM. Internet use and depression among retired older adults in the United States: a longitudinal analysis. *J Gerontol B Psychol Sci Soc Sci*. 2014;69(5):763-771.